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PATENT
Attorney Docket No.: SP00-038

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	Bumgarner, Kirk P et al.
Serial No:	09/733,352
Filing Date:	12/08/2000
Title:	Method and Apparatus for ensile Testing and Rethreading Optical Fiber During Fiber Draw

Examiner: Hoffman, John M
Group Art Unit: 1731

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

This Reply Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated October 27, 2004, in the application listed above. Appellant filed the Notice of Appeal on January 27, 2005, and Appeal Brief on May 18, 2005. Appellant now submits this Reply Brief in response to the Examiner's Answer mailed August 10, 2005.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated.

II. RELATED APPEALS AND INTERFERENCES

With respect to the related appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS

On January 27, 2005 appellant appealed from the final rejections of claims 1-14, 16-

the fiber." Conversely, the load cell 29 in Knowles is connected to plate 28, not the fiber or a pulley which will directly impact upon the load cell.

According to the Federal Circuit, "During examination, "claims ... are to be given their broadest reasonable interpretation consistent with the specification, and ... claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Also, "although the PTO must give claims their broadest reasonable interpretation, this interpretation must be consistent with the one that those skilled in the art would reach." In re Hyatt, 211 F.3d 1367, 54 USPQ2d 1664 (Fed. Cir. 2000).

With respect to claim 34, none of the references mention or suggest such a load cell which is connected to a pulley which in turn contacts the fiber, the fiber contact causing said pulley to rotate. In fact, the word "pulley" does not even appear in either of the references cited.

With respect to claim 35, none of the references mention or suggest such a load cell which is connected to a pulley which in turn contacts the fiber, the fiber contact causing said pulley to rotate, and wherein a computer monitors said tension in said fiber via said load cell.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a *prima facie* case of obviousness, and that the Board should reverse the §103 rejection and find that claims 4-12, 23-30, 33-35 are allowable over the prior art of record.

Conclusion

In conclusion, Appellants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of the pending claims 1-14, 16-30, 33-37, and 59-60.

Please charge the fees due under 37 C.F.R. § 1.17(c) to Deposit Account No. 03-3325. If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. If a fee is required for an extension of

Application No: 09/733,352

time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

Dated: October 11, 2005

By:

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CERTIFICATE OF MAILING (37 CFR 1.8a)
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope Addressed to: Mail Stop Appeal Brief, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 11, 2005

Robert L. Carlson

30, 33-37, and 59-60 which were rejected in the final Office Action dated October 27, 2004. Those are the pending claims that are the subject of this Appeal and are set forth in the attached Appendix.

IV. STATUS OF AMENDMENTS

There are no amendments that have not been entered by the Examiner. The last amendment to the claims was made in the Amendment and Response which was filed on May 14, 2004.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 relates to a method of screening an optical fiber during a fiber draw process. A length of optical fiber 8 is pulled from an optical fiber preform and a tensile stress is imparted to the fiber to test the strength of said fiber. Thereafter the fiber is wound onto a spool 15 (page 8, lines 7-12). The tensile stress is imparted to the fiber 8 by feeding the fiber through a first (20) and second (24) capstan (see page 10, lines 13-30). The fiber tension between the capstans 20,24 is monitored during the draw process via a load cell (see page 10, lines 27-29) and the speed of one of the capstans is adjusted in response to the feedback from the load cell about the monitored tension to maintain a desired tensile screening force on the fiber (see page 11, lines 7-9).

Claim 20 relates to a method of screening an optical fiber during a fiber draw process. A length of optical fiber 8 is pulled from a fiber perform and the desired tensile stress is imparted to the fiber to thereby test the strength of the fiber and subsequent to said imparting a desired tensile stress, the fiber is wound onto a spool which is shipped to a customer or optical fiber cabling operation with the fiber thereon (page 3, lines 2-11). The tensile stress is imparted by feeding the fiber 8 through a screening capstan 24 which works in conjunction with another capstan 20 which is in contact with the fiber 8 to impart the desired tensile stress

to the fiber 8 during the draw process (see page 11, lines 6-9). Tension in the fiber 8 between the screener capstan 24 and the other capstan 20 is monitored and the circumferential speed of the screener capstan 24 is adjusted in response to the monitored tension (see page 11, lines 7-9.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The claims are currently rejected by the Patent Office as follows:

1) Claims 1-3, 11, 13, 14, 16-22, 36-37, and 59-60 are rejected under 35 U.S.C. §103(a) as being unpatentable over Knowles (U.S. Patent No. 4,148,218).

2) Claims 4-12, 23-30, and 33-35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Knowles (U.S. Patent No. 4,148,218) as applied to claims 1-3, 11, 18-19, and 21-23 above, and further in view of Bice (U.S. Patent No. 5,787,216).

VII. ARGUMENT

Applicants note with appreciation that the rejection of claims 1, 13-16, 20, and 59-60 as being unpatentable under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,148,218 (Knowles) has been withdrawn by the Examiner.

The rejection of claims 1-3, 11, 13, 14, 16-22, 36-37, and 59-60 as being unpatentable under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,148,218 (Knowles) is improper

A proper *prima facie* showing of obviousness requires the examiner to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated the skilled artisan to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the examiner must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Col, 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally,

the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

According to the Examiner, in the Examiner's Answer, "Feature 29 (in Knowles) is the load cell (col 2, line 46) that "indicates" the tension." The Examiner also says that "indicates is the same thing as the claimed monitored." The Examiner admits that Knowles does not measure the actual tension.

Applicants disagree that either claims 1 or 20 are obvious in view of Knowles. Nowhere does Knowles suggest that a load cell should be used to monitor fiber tension during the draw process, wherein the speed of one of the capstans is adjusted in response to feedback from the load cell about the monitored tension to thereby maintain a desired tensile screening force on said fiber.

Claims 1 and 20 both require that the tension in said fiber between said screener capstan and said another capstan is monitored and the circumferential speed of said screener capstan is adjusted in response to said monitored tension. "Monitor" is defined in the American Heritage Dictionary as "to scrutinize or check systematically with a view to collecting certain specified categories of data" (see copy of definition enclosed). Even if, assuming arguendo, Examiner is correct in indicating that the load cell would detect a force equal to twice the tension, this is irrelevant, as even in this situation the fiber tension would be measured, albeit perhaps not entirely accurately. On the other hand, Applicants submit that even if the load cell did detect a force equal to twice the tension, in fact this would be an accurate measurement because the operator would know that this is the case and factor this inaccuracy into the process.

The Examiner indicates in his Answer that the definition of monitor is newly presented. Applicants respectfully disagree. Definition of "monitor" as defined in the American Heritage Dictionary was submitted on April 14, 2004 in Response to Final Office Action dated January 14, 2004. Examiner issued an Advisory Action on April 27, 2004, in which the Patent Office indicated that "As to the meaning of "monitor" – there is no evidence that the date at the time of the invention ... It does not matter that Knowles monitoring is different from Applicants because the present claims are so broad as to encompass Knowles. Since Knowles has the same function and result as Applicants monitoring, there is no reason to indicate that it is not "as if" by an electronic device."

Page 10, lines 26-29, of applicants' specification indicates that "turn around pulley 22

is connected to a load cell which monitors the amount of tension applied onto the turn around pulley by the passing fiber, and thus monitors the amount of tension being imparted to the fiber." Similarly, page 11, lines 7-9, indicate that "Feedback from the load cell of the turn around pulley 22 is used to adjust the differential speed of the screening capstan 24 so that a sufficient screening tension is maintained consistently throughout drawing of the entire optical fiber blank into optical fiber." Thus, clearly, in applicants' case, an electronic device keeps track of the tension, and collects information about the tension which is then used to adjust the circumferential speed of said screener capstan, depending on whether the tension is too high or too low. Consequently, it is clear that, as the Examiner himself indicated on page 3 of his Final Rejection dated October 27, 2004, Knowles device does not "monitor" the tension as that term is employed in applicants' specification and claims. Knowles also does not disclose adjusting the speed of a capstan in response to feedback from the load cell about the monitored tension to maintain a desired tensile screening force on the fiber.

According to the Examiner, "it is noted that the claims do not require the tension to be measured: in applicant's embodiment, the load cell would detect a force equal to twice the tension." Applicants disagree, and submit that Examiner's own comment indicates that tension is being measured (i.e., the load cell is measuring a force equal to twice the tension). Both of claims 1 and 20 clearly require the fiber tension between the capstans to be monitored during the draw process and the speed of one of the capstans is adjusted in response to the monitored tension to maintain a desired tensile screening force on the fiber.

According to the Examiner, "For example, if Appellant's figure 2 fiber had a tension of 1 lb-force, then the fiber would place a force of 2 lb-force on wheel 22—because each "leg" of the fiber would impart 1 lb-force on to the wheel. In other words, the broadest reasonable interpretation of the claimed "monitored" is broader than mere measuring the fiber tension." Applicants respectfully do not understand what point the Examiner is making. Further, applicants are not asserting that monitor means mere measuring.

With respect to claim 2, applicants disagree that it would have been obvious to draw the fiber as fast as possible so as to make as much fiber as possible. The Examiner has indicated that, once the fiber is pulled through the second tractor assembly, the speed of the tractor assembly is reduced causing the constant torque device to overload and the clutch to slip. Obviously, if this is the case, the faster one draws the fiber the more the clutch will slip, possibly and even probably to the point where if you pull it as fast as possible, as the

Examiner suggests, then it will likely apply little or no torque at all to the optical fiber. Consequently, applicants submit that there would be no motivation to modify Knowles as proposed by the Examiner, and based on the Examiner's own comments, applicants believe that one skilled in the art would be motivated not to try to increase the draw speed, and that even if one of skill in the art were motivated to try this modification, is it not apparent where such motivation would come from as there is no suggestion in the art cited to do so, and there is no showing that such a modification had a reasonable expectation of success.

Claim 11 requires conducting at least one optical property test on the fiber while the fiber is on said shipping spool by a testing method which involves connecting one end of the fiber on the spool to the light source, and evaluating light which is launched from one light source and emitted from the other end of the fiber. There is obviously no mention or suggestion in any of the references cited of such a test, or the concept of storing such a fiber on a shipping spool which will enable such a test.

Claim 14 depends from claim 13 and thus requires that the second capstan be rotated at a higher circumferential speed than the first capstan, and also that the method further comprises adjusting the speed of the second capstan in response to the monitored tension, to thereby maintain said tensile stress. There is no mention or suggestion in the references cited of maintaining the speed of the second capstan in response to monitored tension.

Claim 16 requires that the load cell be connected to the pulley which in turn contacts the fiber, said fiber causing the pulley to rotate. There is no mention or suggestion in Knowles of a load cell connected to a pulley. In fact, the word pulley does not appear in Knowles. According to the Examiner, "33 of Figure 2 of Knowles is the pulley which is connected (via 11) to the load cell". Applicants respectfully disagree that Fig. 2 in Knowles discloses a load cell connected to a pulley which in turn contacts the fiber. Instead, the load cell in Knowles is connected to plate 28. Applicants submit that if the components referred to by the Examiner are connected as defined by applicants claim 16, then every component of every machine in the world is connected (via air, water, continents or whatever atmosphere or parts are needed to complete the connection). As explained above, Page 10, lines 26-29, of applicants' specification indicates that "turn around pulley 22 is connected to a load cell which monitors the amount of tension applied onto the turn around pulley by the passing fiber, and thus monitors the amount of tension being imparted to the fiber." Similarly, page 11, lines 7-9, indicate that "Feedback from the load cell of the turn around pulley 22 is used

to adjust the differential speed of the screening capstan 24 so that a sufficient screening tension is maintained consistently throughout drawing of the entire optical fiber blank into optical fiber."

According to the Examiner with respect to claim 17, "It would have been obvious to have all of the features being connected and/or controlled by a computer so as to easily monitor the process variables, and to store the date so that one can go back and review what went wrong and what went right." Applicants submit that the statement by the Examiner is not mentioned or suggested at all by any of the references, and in fact the Examiner is merely stating the advantage of applicants' invention as defined by claim 17 and indicating that it would have been obvious, with no apparent motivation to make the modification proposed. This is clearly a hindsight reconstruction by the Patent Office.

Claims 18 and 36 require that less than 150 km and less than 100 km, respectively are wound onto the spool. Claims 19 and 37 requires that a length of fiber is wound onto a spool which is sufficiently short to enable the attenuation of the fiber to be measured while the fiber is on the spool. There is no mention or suggestion in any of the references cited of such a method step as defined by claims 18-19 or 36-37.

With respect to claims 18-19 and 36-37, the Examiner indicates that it would have been obvious to have as much or as little fiber on the spool as desired. The Examiner refers to In re Rinehart, 189 USPQ 143 (CCPA 1976), and states that "mere scaling up of a prior art process capable of being scaled up, it such were the case, would not establish patentability in a claim to an old process so scaled."

The Examiner is apparently taking the position that applicants invention is a mere commercial scale up of the device illustrated in Knowles. Applicants disagree, and further disagree that Rinehart is applicable to the present issue.

In Rinehart, the claims differed from those of the prior art only in reciting "commercial scale production" utilizing "commercial scale quantities" (see Rinehart 189 USPQ at p.145). Unlike Rinehart, applicants claims in fact do not contain the words "commercial scale production" nor can applicants invention possibly be considered to be a scale up of the method disclosed in Knowles. For one thing, both methods appear to be of commercial scale. Second, applicants claim actually require "less than" an amount of fiber, not "more than" as would be the case if something were being scaled up.

Claim 20 requires the tension of the fiber in between a screener capstan and another

capstan to be monitored and the circumferential speed of the screener capstan is adjusted in response to the monitored tension. There is no mention or suggestion in Knowles of monitoring tension between a screener capstan and another capstan.

Claims 59 and 60 require that the monitoring be done electronically. It is submitted that none of the prior art references, alone or in combination, describe electronic monitoring of the tension at load cell and adjusting in response to feedback from a load cell. According to the Patent Office, claims 59-60 are clearly met. Applicants cannot understand this rejection as electronic monitoring does not appear to be mentioned in Knowles.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a *prima facie* case of obviousness, and that the Board should reverse the §103 rejection and find that claims 1-3, 11, 13, 14, 16-22, and 36-37 are allowable over the prior art of record.

<u>The rejection of claims 4-12, 23-30, 33-35 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,148,218 (Knowles), and further in view of U.S. Patent No. 5,787,216 (Bice) is improper.</u>

According the Examiner, "Knowles does not disclose the ends being accessed for the optical testing. Bice, starting at column 1, line 26, discloses that one of the most important tests is OTDR which requires that the fiber be such that light travels from one end of the fiber (and back?). This requires that light be accessible to both ends of the fiber because it must travel to the second end if it is to reflect back from that end." Thus, the Examiner appears to take the position that both ends are accessible because if you shine light from one of the fiber it will travel to the other end of the fiber.

This is clearly not what is meant by enabling "access to both ends of the fiber" as defined by claim 4. As applicants indicate on page 9, lines 14 through 18, "because the spool enables access to both ends of the fiber, optical and other testing can be conducted on the fiber which is stored upon spool 15 after the fiber draw and winding process, without having to remove the entire length of fiber from the spool or rethread the fiber onto a different spool." Thus, it is clear from applicants' specification that, by access, applicants mean that the spool must enable both ends of the fiber to be mechanically accessed. An example of such spool which will enable such access to both ends of the fiber is illustrated in Fig. 6, which of course the above description is directed to.

According to the Examiner in the Examiner's Answer, "it is argued that applicant

actually meant that both ends of the fiber to be mechanically accessed (i.e., not optically accessed). As indicated above, limitations are based on what is actually claimed, not what is meant by applicant. In such circumstances the burden is on applicant to clarify the claims to more accurately describe what was meant".

According to the Federal Circuit, "During examination, "claims ... are to be given their broadest reasonable interpretation consistent with the specification, and ... claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Also, "although the PTO must give claims their broadest reasonable interpretation, this interpretation must be consistent with the one that those skilled in the art would reach." In re Hyatt, 211 F.3d 1367, 54 USPQ2d 1664 (Fed. Cir. 2000).

Applicants submit that Examiner's interpretation is not reasonable in light of the specification, and submit that in view of the specification one of skill in the art would readily interpret "access" to mean mechanical access.

The examiner indicated in his answer that "Appellant has not even argued that mechanically exposing both ends of the fiber is a new or unobvious modification." Applicants submit that whether or not they have argued this point is irrelevant to patentability. As far as applicants are aware, the claims stand rejected on the combination of Knowles and Bice, not Knowles/Bice and the fact that applicants have not argued that something is new. For the record and also for sake of clarity, Applicants submit that there is no mention or suggestion in Knowles or Bice, either alone or in combination, of winding a fiber onto a spool such that both ends of the fiber can be mechanically accessed while on the spool, as required by claim 4.

With respect to claim 33, none of the references disclose a device which monitors tension via a load cell which is operatively connected to the fiber.

According to the Examiner in the Examiner's Answer, "clearly all of the features in the Knowles invention operate in connection to create an optical fiber – thus everything is operatively connected."

Claim 33 in fact requires "monitoring said tension via a load cell operatively connected to said fiber". As indicated at page 4, lines 2-4 of applicants specification, "For example, the tension in the fiber can be monitored via a load cell (for example, which may be located between the two capstans) operatively connected to a pulley, which in turn contacts

VIII. CLAIMS APPENDIX

The claims on appeal are as follows:

1. (rejected) A method of screening an optical fiber during a fiber draw process, comprising pulling a length of optical fiber from an optical fiber preform imparting a tensile stress to said fiber to thereby test the strength of said fiber and subsequent to said imparting a tensile stress, winding said fiber onto a spool, wherein said tensile stress is imparted to said fiber via a first and second capstan, fiber tension between said capstans is monitored during the draw process via a load cell, and the speed of one of the capstans is adjusted in response to feedback from the load cell about the monitored tension to maintain a desired tensile screening force on said fiber.

2. (rejected) The method of claim 1, wherein said fiber draw speed is greater than 20 m/s.

3. (rejected) The method of claim 1, wherein said desired tensile stress is greater than about 95 psi.

4. (rejected) The method of claim 1, wherein said fiber is wound onto a spool which enables access to both ends of said fiber while said fiber is retained on said spool.

5. (rejected) The method of claim 4, further comprising, shipping said shipping spool with said fiber thereon to a customer.

6. (rejected) The method of claim 2, wherein said fiber is wound onto a spool which enables access to both ends of said fiber while said fiber is retained on said spool.

7. (rejected) The method of claim 2, wherein said fiber is wound onto said shipping spool in a manner which enables both ends of said fiber to be accessed while said fiber is stored on said spool.

8. (rejected) The method of claim 4, wherein said fiber is wound onto said shipping spool in a manner which enables both ends of said fiber to be accessed while said fiber is stored on said spool.

9. (rejected) The method of claim 5, wherein said method further comprising, prior to said shipping, conducting tests on said fiber while said fiber is on said spool.

10. (rejected) The method of claim 9, wherein said tests include at least one test selected from the group consisting of optical time domain reflectometry, dispersion geometry and

polarization mode dispersion.

11. (rejected) The method of claim 2, further comprising conducting at least one optical property test on said fiber while said fiber is on said shipping spool by a testing method which involves connecting one end of said fiber on said spool to a light source, and evaluating light which is launched from said light source and emitted from the other end of the fiber.

12. (rejected) The method of claim 9, further comprising conducting at least one optical property test on said fiber while said fiber is on said shipping spool by a testing method which involves connecting one end of said fiber on said spool to a light source, and evaluating the light at the other end of the fiber.

13. (rejected) The method of claim 1, wherein said second capstan is rotated at a higher circumferential speed than said first capstan to thereby impart said desired tensile stress.

14. (rejected) The method of claim 13, further comprising adjusting the speed of said second capstan in response to said monitored tension, to thereby maintain said tensile stress.

15. (cancelled)

16. (rejected) The method of claim, wherein said load cell is connected to a pulley which in turn contacts said fiber, said fiber contact causing said pulley to rotate

17. (rejected) The method of claim, wherein a computer monitors said tension in said fiber via said load cell.

18. (rejected) The method of claim 4, wherein less than 150 km of fiber is wound onto said spool.

19. (rejected) The method of claim 4, wherein a length of fiber is wound onto said spool which is sufficiently short to enable the attenuation of said fiber to be measured while said fiber is on said spool.

20. (rejected) A method of screening an optical fiber during a fiber draw process, comprising pulling a length of optical fiber from an optical fiber preform, imparting a desired tensile stress to said fiber to thereby test the strength of said fiber and subsequent to said imparting a desired tensile stress, winding said fiber onto a spool which is to be shipped to a customer or optical fiber cabling operation with said fiber thereon, wherein said imparting a tensile stress comprises feeding said fiber through a screener capstan which works in conjunction with another capstan which is in contact with said fiber to impart said desired tensile stress to said fiber during said draw process, and the tension in said fiber between said screener capstan and said another capstan is monitored and the circumferential speed of said

screener capstan is adjusted in response to said monitored tension.

21. (rejected) The method of claim 20, wherein said desired tensile stress is greater than about 80 psi.

22. (rejected) The method of claim 20, wherein said desired tensile stress is greater than about 95 psi.

23. (rejected) The method of claim 20, further comprising shipping said spool with said fiber thereon to a customer.

24. (rejected) The method of claim 20, wherein said fiber is wound onto said spool in a manner which enables access to both ends of said fiber while said fiber is stored on said spool.

25. (rejected) The method of claim 23, wherein said fiber is wound onto said shipping spool in a manner which enables both ends of said fiber to be accessed while said fiber is stored on said spool.

26. (rejected) The method of claim 20, wherein said fiber is wound onto said shipping spool in a manner which enables both ends of said fiber to be accessed while said fiber is stored on said spool.

27. (rejected) The method of claim 26, wherein said method further comprises, prior to said shipping, conducting tests on said fiber while said fiber is on said spool.

28. (rejected) The method of claim 26, wherein said method further comprises, prior to said shipping, conducting tests on said fiber while said fiber is on said spool.

29. (rejected) The method of claim 28, wherein said tests include at least one test selected form the group consisting of optical time domain reflectometry, dispersion geometry and polarization mode dispersion.

30. (rejected) The method of claim 28, further comprising conducting at least one optical property test on said fiber while said fiber is on said shipping spool by a testing method which involves connecting one end of said fiber on said spool to a light source, launching light from said light source through said fiber, and evaluating said launched light at the other end of said fiber.

31. (canceled)

32. (canceled)

33. (rejected) The method of claim 30, wherein said monitoring step comprises monitoring said tension via a load cell operatively connected to said fiber.

34. (rejected) The method of claim 33, wherein said load cell is connected to a pulley which in turn contacts said fiber, said fiber contact causing said pulley to rotate.

35. (rejected) The method of claim 34, wherein a computer monitors said tension in said fiber via said load cell.

36. (rejected) The method of claim 20, wherein no more than 100 km of fiber is wound onto said spool.

37. (rejected) The method of claim 20, wherein a length of fiber is wound onto said spool which is sufficiently short to enable the attenuation of said fiber to be measured while said fiber is on said spool.

38-58 (cancelled)

59. (rejected) The method of claim 1, wherein said tension is monitored electronically.

60. (rejected) The method of claim 20, wherein said tension is monitored electronically.

IX. EVIDENCE APPENDIX

1. Definition of "monitor" as defined in the American Heritage Dictionary as "to keep track of by or as if by an electronic device" or "to scrutinize or check systematically with a view to collecting certain specified categories of data", was submitted on April 14, 2004 in Response to Final Office Action dated January 14, 2004. Examiner issued an Advisory Action on April 27, 2004, in which the Patent Office indicated that "As to the meaning of "monitor" – there is no evidence that the date at the time of the invention ... It does not matter that Knowles monitoring is different from Applicants because the present claims are so broad as to encompass Knowles. Since Knowles has the same function and result as Applicants monitoring, there is no reason to indicate that it is not "as if" by an electronic device."

2. Definition of "clutch" as defined in the American Heritage Dictionary was submitted on September 16, 2004, in Response to the Office Action of June 16, 2004. Evidence was entered into record by Examiner in paper number 41022 dated October 27, 2004.

3. Mechanical Measurements, by T. G. Beckwith, pages 313-317 was submitted on September 16, 2004, in Response to the Office Action of June 16, 2004.

Application No: 09/733,352

Evidence was entered into record by Examiner in paper number 41022 dated October 27, 2004.

X. RELATED PROCEEDINGS APPENDIX

None

MECHANICAL MEASUREMENTS

by

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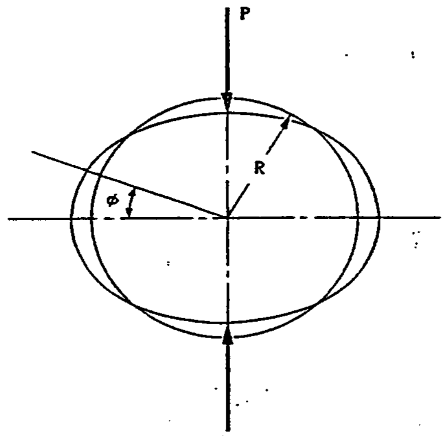

FIG. 11–8. Ring loaded diametrically in compression.

readings still will be obtained provided both zero and loaded readings are made by the same person. With 40 to 64 micrometer threads per inch, readings may be made to one- or two-hundred thousandths of an inch [5].

The equation given in Table 11–1 for circular rings is derived with the assumption that the radial thickness of the ring is small compared with the radius. Most proving rings are made of section with appreciable radial thickness. However, Timoshenko [6] shows that use of the thin-ring rather than the thick-ring relations introduces errors of only about 4% for a ratio of section thickness to radius of 1/2. Increased stiffness in the order of 25% is introduced by the effects of integral bosses [5]. It is, therefore, apparent that use of the simpler thin-ring equation is normally justified.

Stresses may be calculated from the bending moments, M, determined by the relation [6]

$$M = \frac{PR}{2}\left(\cos\phi - \frac{2}{\pi}\right). \tag{11–6}$$

Symbols correspond to those shown in Fig. 11–8.

(c) *Strain-gauge load cells.* Instead of using total deflection as a measure of load, the strain-gauge load cell measures load in terms of *unit* strain. Resistance gauges are very suitable for this purpose (see Chapter 10). One of the many possible forms of elastic member is selected, and the gauges are mounted to provide maximum output. If the loads to be measured are large, the direct tensile-compressive member may be used. If the loads are small, strain amplification provided by bending may be employed to advantage.

Figure 11–9 illustrates the arrangement for a tensile-compressive cell using all four gauges sensitive to strain and providing temperature com-

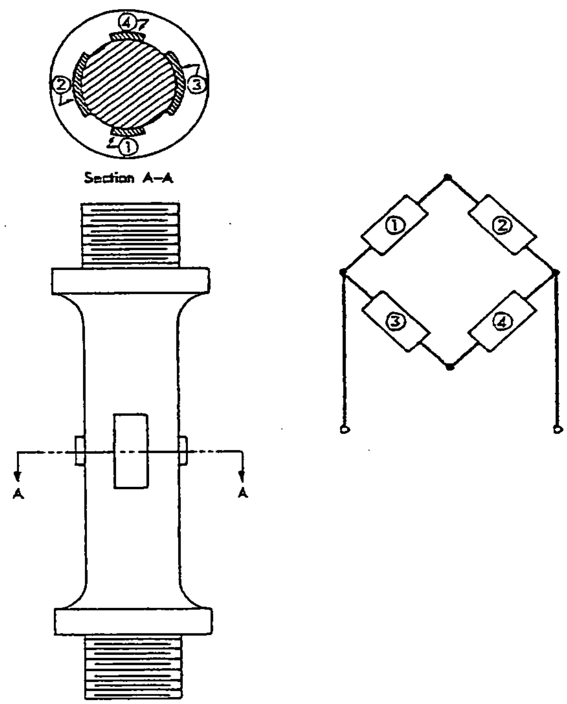

FIG. 11–9. Tension-compression resistance strain-gauge load cell.

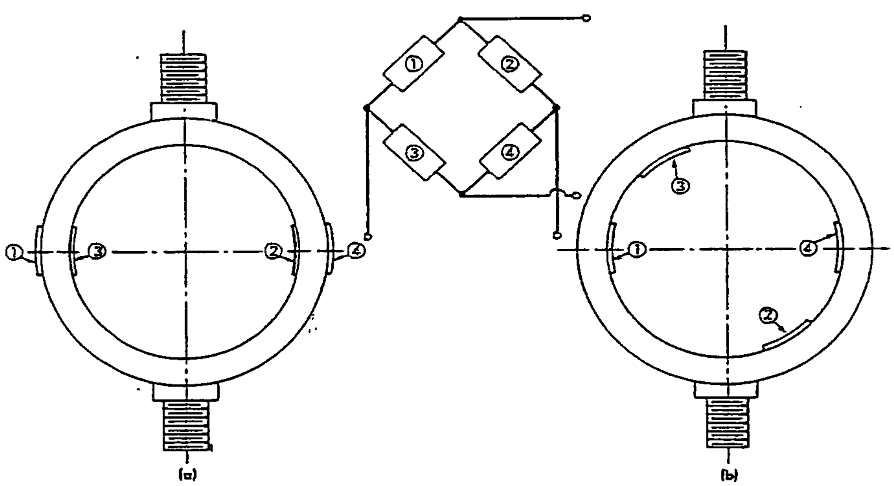

FIG. 11–10. Two arrangements of circular-shaped load cells employing resistance strain gauges as secondary transducers.

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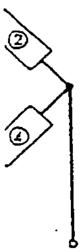

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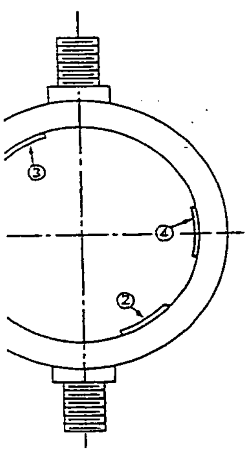

load cells employing

pensation for the gauges. The bridge constant (Art. 10–9d) in this case will be $2(1 + \mu)$, where μ is Poisson's ratio for the material. Compression cells of this sort have been used with a capacity of 3 million pounds [8]. Simple beam arrangements may also be used, as illustrated in Figs. 10–13 and 10–34.

Figures 11–10(a) and (b) illustrate proving-ring strain-gauge load cells. In Fig. 11–10(a) the bridge output is a function of the bending strains only, the axial components being canceled in the bridge arrangement. By mounting the gauges as shown in Fig. 11–10(b), somewhat greater sensitivity may be obtained because the output includes both the bending and axial components sensed by gauges 1 and 4.

(d) *Temperature sensitivity.* The sensitivity of elastic load-cell elements is affected by temperature variation. This change is caused by two factors: variation in Young's modulus and altered dimensions, both brought about by temperature change. Variation in Young's modulus is the more important of the two effects, amounting to roughly $2\frac{1}{2}\%$ per 100°F. On the other hand, the increase in cross-sectional area of a tension member of steel will amount to only about 0.15% per 100°F change.

Obviously, when accuracies of $\pm\frac{1}{2}\%$ are desired, as provided by certain commercial cells, a means of compensation, particularly for variation in Young's modulus, must be supplied. When resistance strain gauges are used as secondary transducers, this is accomplished electrically by causing the bridge's electrical sensitivity to change in the opposite direction to the modulus effect [9]. As temperature increases, the deflection constant for the elastic element decreases; it becomes more *springy*, and deflects a greater amount for a given load. This increased sensitivity is offset by reducing the sensitivity of the strain-gauge bridge through use of a thermally sensitive compensating resistance element, R_s, as shown in Fig. 11–11.

As discussed in Art. 6–18d, the introduction of a resistance in an input-lead reduces the electrical sensitivity of an equal-arm bridge by the factor n, expressed as follows:

$$n = \frac{1}{1 + (R_s/R)}.$$

Requirements for compensation may be analyzed through use of the relation for the initially balanced equal-arm bridge, Eq. (6–44). If we assume

$$2\frac{\Delta R}{R} \ll 4,$$

Eq. (6–44) may be modified to read

$$\frac{\Delta e_o}{e_i} = \frac{k}{4}\frac{\Delta R}{R}.$$

This is true, particularly for a *strain-gauge bridge* for which $\Delta R/R$ is always small. A bridge constant, k, is included to account for use of more than one active gauge. If all four gauges are equally active, $k = 4$. For the arrangement shown in Fig. 11–9, $k = 2(1 + \mu)$, where μ is Poisson's ratio. If we account for the compensating resistor, the equation will then read

$$\frac{\Delta e_o}{e_i} = \frac{k}{4}\frac{\Delta R}{R}\left[\frac{1}{1 + (R_s/R)}\right]. \qquad (11\text{–}7)$$

Rewriting Eq. (10–7),

$$\epsilon = \left(\frac{1}{F}\right)\left(\frac{\Delta R}{R}\right),$$

and from the definition of Young's modulus, E, Eq. (10–2),

$$P = EA\epsilon.$$

We may solve for sensitivity,

$$\frac{\Delta e_o}{P} = \left(\frac{e_i}{4}\right)\left(\frac{FRk}{A}\right)\left[\frac{1}{E(R + R_s)}\right]. \qquad (11\text{–}8)$$

If it is assumed that the gauges are arranged for compensation of resistance variation with temperature and that the gauge factors F remain unchanged with temperature, and, further, that any change in the cross-sectional area of the elastic member may be neglected, then complete compensation will be accomplished if the quantity $E(R + R_s)$ remains constant with temperature.

Using Eqs. (6–20) and (6–28), we may write

$$E(R + R_s) = E(1 + c\,\Delta T)[R + R_s(1 + b\,\Delta T)], \qquad (11\text{–}9)$$

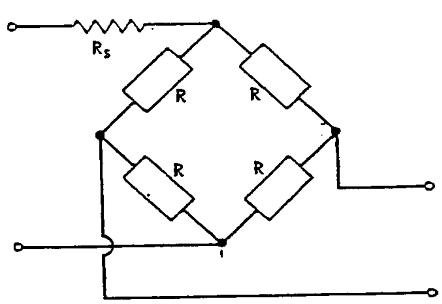

FIG. 11–11. Schematic diagram of a strain-gauge bridge with a compensation resistor.

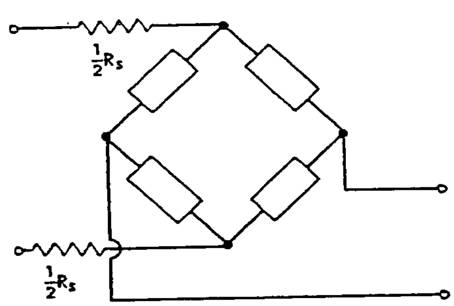

FIG. 11–12. Strain-gauge bridge with two compensation resistors.

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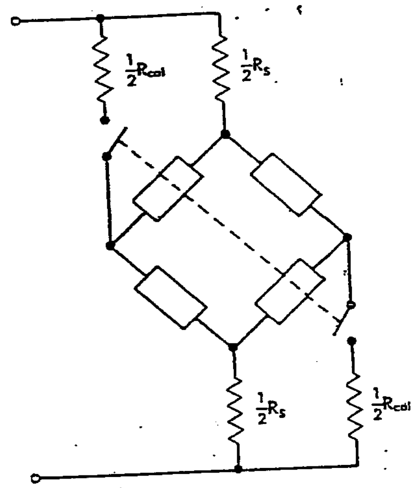

FIG. 11-13. Schematic diagram of a strain-gauge bridge showing how calibration may be accomplished.

from which we find

$$\frac{R_s}{R} = -\frac{c}{b+c}. \tag{11-10}$$

This indicates that temperature compensation may possibly be accomplished through proper balancing of the temperature coefficients of Young's modulus, c, and electrical resistivity, b. Because c is usually negative (see Table 6-1) and because the resistances cannot be negative, it follows that

$$b > -c.$$

In addition, we may write [See Eq. (5-2)]

$$R_s = \rho\frac{L}{A} = -R\left(\frac{c}{b+c}\right), \tag{11-11}$$

from which

$$L = -\frac{RA}{\rho}\left(\frac{c}{b+c}\right). \tag{11-11a}$$

From these relations, specific requirements for compensation may be derived. After a resistance material, usually in the form of wire, is selected, the required length may be determined through use of Eq. (11-11a).

Although a single resistor would serve, commercial cells normally use two modulus resistors, as shown in Fig. 11-12. This assures proper connections regardless of instrumentation and also permits electrical calibra-

single source for people who need to be

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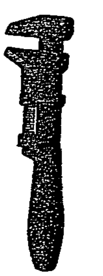
gol. 2. **mongoloid**. Characterized by, affected with, or relating to Down's syndrome. —*n.* 1. *Anthropol.* A member of the Mongoloid ethnic division of the human species. 2. **mongoloid**. A person affected with Down's syndrome.
mon·goose (mŏng'go͞os', mŏn'-) *n., pl.* **-goos·es**. Any of various Old World carnivorous mammals of the genus *Herpestes* and related genera, having a slender body and a long tail and notable for being able to kill venomous snakes. [Marathi *mangūs*, of Dravidian orig.]
mon·grel (mŭng'grəl, mŏng'-) *n.* 1. An animal or plant, esp. a dog, resulting from various interbreedings. 2. A cross between two different breeds. —*adj.* Of mixed origin or character. [Prob. < ME *mong*, mixture < OE *(ge)mang*.] —**mon·grel·ism** *n.* —**mon'grel·ly** *adv.*
mon·grel·ize (mŭng'grə-līz', mŏng'-) *tr.v.* **-ized, -iz·ing, -iz·es**. To make mongrel in race, nature, or character. —**mon'grel·i·za'tion** *n.*
mon·ick·er (mŏn'ĭ-kər) *n.* Variant of **moniker**.
mon·ied (mŭn'ēd) *adj.* Variant of **moneyed**.
mon·ies (mŭn'ēz') *n.* A plural of **money**.
mon·i·ker or **mon·ick·er** (mŏn'ĭ-kər) *n. Slang.* A personal name or nickname. [Orig. unknown.]
mo·nil·i·a·sis (mō'nə-lī'ə-sĭs, mŏn'ə-) *n.* Candidiasis. [NLat. *Monilia*, fungus genus + -IASIS.]
mo·nil·i·form (mō-nĭl'ə-fôrm') *adj.* Resembling a string of beads, as various plant roots, the antennae of certain insects, and the nuclei of some members of the Ciliata. [Lat. *monile*, necklace + -FORM.] —**mo·nil'i·form'ly** *adv.*
mon·ish (mŏn'ĭsh) *tr.v.* **-ished, -ish·ing, -ish·es**. To admonish; warn. [ME *monesen* < OFr. *monester* < VLat. **monestare* < Lat. *monēre*, to warn.]
mo·nism (mō'nĭz'əm, mŏn'ĭz'əm) *n. Philos.* A metaphysical system in which reality is conceived as a unified whole. —**mo'nist** *n.* —**mo·nis'tic** (mō-nĭs'tĭk, mŏ-) *adj.* —**mo·nis'ti·cal·ly** *adv.*
mo·ni·tion (mō-nĭsh'ən, mə-) *n.* 1. A warning or intimation of impending danger. 2. a. An admonition. b. A piece of advice; counsel. 3. A formal order from a bishop or ecclesiastical court to refrain from a specified offense. [ME *monicion* < OFr. *monition* < Lat. *monitio* < *monēre*, to warn.]
mon·i·tor (mŏn'ĭ-tər) *n.* 1. One that admonishes, cautions, or reminds. 2. A pupil who assists a teacher in routine duties. 3. a. A device used to record or control a process or activity. b. A screen used to view or check the picture being picked up by a television camera. 4. An articulated device holding a rotating nozzle, used in mining and fire-fighting. 5. a. A heavily ironclad warship of the 19th century with a low, flat deck and one or more gun turrets. b. A modern warship designed for coastal bombardment. 6. Any of various tropical carnivorous lizards of the genus *Varanus*, ranging in length from several inches to ten feet. —*v.* **-tored, -tor·ing, -tors**. —*tr.* 1. To check (the transmission quality of a signal) by means of a receiver. 2. To test for radiation intensity. 3. To keep track of by or as if by an electronic device. 4. To check by means of a receiver for significant content. 5. To scrutinize or check systematically with a view to collecting certain specified categories of data. 6. To keep watch over; supervise: *monitor an examination.* 7. To direct as a monitor. —*intr.* To act as a monitor. [Lat. < *monēre*, to warn.]
mon·i·to·ri·al (mŏn'ĭ-tôr'ē-əl, -tōr'-) *adj.* Of, pertaining to, or performed by monitors. —**mon'i·to'ri·al·ly** *adv.*
mon·i·to·ry (mŏn'ĭ-tôr'ē, -tōr'ē) *adj.* Conveying an admonition or warning: *a monitory glance.* —*n., pl.* **-ries**. A letter of admonition. [Lat. *monitorius* < *monitor*, monitor.]
monk (mŭngk) *n.* A member of a religious brotherhood living in a monastery and devoted to a discipline prescribed by his order. [ME *munk* < OE *munuc* < LLat. *monachus* < LGk. *monakhos* < Gk., single < *monos*.]
monk·er·y (mŭng'kə-rē) *n., pl.* **-ies**. 1. Monastic life or practices. 2. Monks collectively. 3. A monastery.
mon·key (mŭng'kē) *n., pl.* **-keys**. 1. A member of the order Primates, excluding man; specifically, any of the long-tailed primates, including the Old and New World monkeys and the marmosets, and usually excluding the anthropoid apes and the lemurs, lorises, tree shrews, and tarsiers. 2. A mischievous, playful child or young person. 3. The iron block of a pile driver. 4. *Slang.* A person who is mocked, duped, or made to appear a fool. 5. *Slang.* Drug addiction, regarded as a burdensome affliction: *have a monkey on one's back.* —*v.* **-keyed, -key·ing, -keys**. —*intr. Informal.* 1. To play, fiddle, or tamper with something idly. 2. To behave in a mischievous or apish manner. —*tr.* To imitate or mimic; ape. [Prob. of LG orig.]
monkey bread *n.* The fruit of the baobab.
monkey business *n. Slang.* Silly, mischievous, or deceitful acts.
mon·key·flow·er (mŭng'kē-flou'ər) *n.* Any of various plants of the genus *Mimulus*, having variously colored, two-lipped flowers.
monkey jacket *n.* 1. A short, tight-fitting jacket, formerly worn by sailors. 2. A mess jacket.
monkey pot *n.* 1. a. The large, urn-shaped lidded pod of tropical trees of the genus *Lecythis*. b. A tree bearing this type of pod. 2. A cylindrical or barrel-shaped melting pot used in making flint glass.

monkey
Callimico goeldi

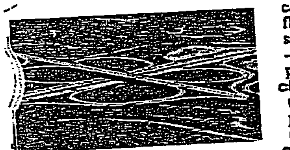


monkey wrench

monocle

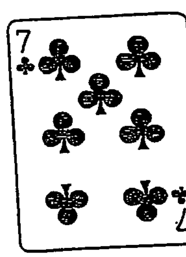
monkey puzzle *n.* An evergreen tree, *Araucaria araucana*, native to Chile, having intricately ramifying branches covered with stiff, prickle-tipped leaves.
mon·key·shine (mŭng'kē-shīn') *n.* Often **monkeyshines**. *Slang.* A playful trick; prank.
monkey wrench *n.* 1. A hand tool with adjustable jaws for turning nuts of varying sizes. 2. *Informal.* Something that disrupts: *threw a monkey wrench into our plans.* [Orig. unknown.]
monk·fish (mŭngk'fĭsh') *n., pl.* **monkfish** or **-fish·es**. The goosefish. [From the cowled appearance of its head.]
Mon-Khmer (mōn'kmĕr') *n.* A subfamily of the Austro-Asiatic language family that includes Mon, Khmer and other languages of Southeast Asia.
monk·hood (mŭngk'ho͝od') *n.* 1. The state or profession of a monk; monasticism. 2. Monks collectively.
monk·ish (mŭng'kĭsh) *adj.* 1. Of, relating to, or characteristic of monks or monasticism. 2. Of or inclined to self-denial.
monk's cloth *n.* A heavy cotton cloth in a coarse basket weave.
monks·hood (mŭngks'ho͝od') *n.* Any of various usually poisonous plants of the genus *Aconitum*, having hooded flowers of various colors.
mon·o[1] (mŏn'ō) *n.* Mononucleosis (sense 2).
mon·o[2] (mŏn'ō) *adj.* Monaural (sense 2).
mono– or **mon–** *pref.* 1. One; single; alone: *monomorphic.* 2. Containing a single atom, radical, or group: *monobasic.* 3. Monomolecular; monatomic: *monolayer.* [ME < OFr. < Lat. < Gk. < *monos*, single, alone.]
mon·o·ac·id (mŏn'ō-ăs'ĭd) also **mon·o·a·cid·ic** (mŏn'ō-ə-sĭd'ĭk) *adj.* Having only one hydroxyl group to react with acids. —*n.* **monoacid**. An acid having one replaceable hydrogen atom.
mon·o·am·ine (mŏn'ō-ăm'ēn, -ə-mēn') *n.* An amine compound having one amino group.
monoamine oxidase *n.* An enzyme that acts as a catalyst in the oxidative deamination of monoamines.
mon·o·ba·sic (mŏn'ə-bā'sĭk) *adj.* 1. Monoprotic. 2. Having only one metal ion or positive radical.
mon·o·carp (mŏn'ə-kärp') *n.* A monocarpic plant.
mon·o·car·pel·lar·y (mŏn'ə-kär'pə-lĕr'ē) *adj.* Consisting of only one carpel.
mon·o·car·pic (mŏn'ə-kär'pĭk) also **mon·o·car·pous** (-kär'pəs) *adj.* Flowering and bearing fruit only once.
Mo·noc·er·os (mə-nŏs'ər-əs) *n.* 1. A constellation near Canis Major and Canis Minor. 2. **monoceros**. *Obs.* a. A one-horned fish, such as the swordfish. b. A unicorn. [ME, unicorn < OFr. < Lat. < Gk. *monokerōs*, having one horn : *monos*, one + *keras*, horn.]
mon·o·cha·si·um (mŏn'ə-kā'zē-əm, -zhē-əm) *n., pl.* **-sia** (-zē-ə, -zhē-ə). A cyme having a single main stem. —**mon'o·cha'si·al** *adj.* [MONO- + (DI)CHASIUM.]
mon·o·chord (mŏn'ə-kôrd') *n. Mus.* An acoustical instrument consisting of a sounding box with one string and a movable bridge, used to study musical tones. [ME *monocorde* < OFr. < Med. Lat. *monochordum* < Gk. *monokhordon* : *monos*, one + *khordē*, string.]
mon·o·chro·mat·ic (mŏn'ə-krō-măt'ĭk) also **mon·o·chro·ic** (-krō'ĭk) *adj.* 1. Having only one color. 2. Having or producing light of only one wavelength. [Lat. *monochromatos* < Gk. *monokhrōmatos* : *monos*, one + *khrōma*, color.] —**mon'o·chro·mat'i·cal·ly** *adv.* —**mon'o·chro'ma·tic'i·ty** (-mə-tĭs'ĭ-tē) *n.*
mon·o·chrome (mŏn'ə-krōm') *n.* 1. A painting done in different shades of one color. 2. The technique of executing monochrome paintings. [Med. Lat. *monochroma* < Gk. *monokhrōmos*, of one color : *monos*, one + *khrōma*, color.] —**mon'o·chro'mic** (-krō'mĭk) *adj.*
mon·o·cle (mŏn'ə-kəl) *n.* An eyeglass for one eye. [Fr. < LLat. *monoculus*, having one eye : Gk. *monos*, one + Lat. *oculus*, eye.] —**mon'o·cled** (-kəld) *adj.*
mon·o·cline (mŏn'ə-klīn') *n.* A geologic formation in which all strata are inclined in the same direction. —**mon'o·cli'nal** *adj.*
mon·o·clin·ic (mŏn'ə-klĭn'ĭk) *adj.* Of or pertaining to three unequal crystal axes, two of which intersect obliquely and are perpendicular to the third.
mon·o·cli·nous (mŏn'ə-klī'nəs) *adj.* Having pistils and stamens in the same flower. [NLat. *monoclinus* : Gk. *monos*, one + Gk. *klinē*, couch.]
mon·o·coque (mŏn'ə-kōk', -kŏk') *n.* A metal structure, as of an aircraft, in which the covering absorbs a large part of the stresses to which the body is subjected. [Fr. : Gk. *monos*, one + *coque*, shell < Lat. *coccum*, berry < Gk. *kokkos*.]
mon·o·cot·y·le·don (mŏn'ə-kŏt'l-ēd'n) also **mon·o·cot** (mŏn'ə-kŏt') *n.* Any of various plants of the Monocotyledonae, one of the two major divisions of angiosperms, characterized by a single embryonic seed leaf that appears at germination. Included among the monocotyledons are such plants as grasses, orchids, and lilies. [NLat. *Monocotyledones*, class name : MONO- + Lat. *cotyledon*, navelwort, see COTYLEDON.] —**mon'o·cot'y·le'don·ous** *adj.*
mo·noc·ra·cy (mō-nŏk'rə-sē, mə-) *n.* Government or rule by a single person; autocracy. —**mon'o·crat'** (mŏn'ə-krăt') *n.* —**mon'o·crat'ic** *adj.*
mo·noc·u·lar (mō-nŏk'yə-lər, mə-) *adj.* 1. Having or pertaining to one eye. 2. Adapted for the use of one eye. [LLat. *monoculus*, having one eye. —see MONOCLE] —**mo·noc'u·lar·ly** *adv.*

mon·o·cy·cle (mŏn'ə-sī'kəl) *n.* A unicycle.
mon·o·cyte (mŏn'ə-sīt') *n.* A large white b[lood cell] having a pale, oval nucleus and more pro[…] lymphocyte. —**mon'o·cyt'ic** (-sĭt'ĭk), **mon'[o·cy]toid'** *adj.*
mon·o·dac·tyl (mŏn'ə-dăk'tl) *n.* An animal h[aving one] claw on each extremity. [< Gk. *monodaktu[los]* […] toe : *monos*, one + *daktulos*, toe.] —**mon'o·**[…]
mon·o·dra·ma (mŏn'ə-drä'mə, -drăm'ə) *n.* A [com]position written for one performer. —**m**[…] (-drə-măt'ĭk) *adj.*
mon·o·dy (mŏn'ə-dē) *n., pl.* **-dies**. 1. An ode [sung by one] actor, as in Greek drama. 2. An elegiac v[…] personal lament. 3. *Mus.* a. A style of compo[sition in which] one vocal part or melodic line predominates. [b. A composi]tion in this style. [LLat. *monodia* < Gk. *mo[nōidia]* […] one + *oidē*, song.] —**mo·nod'ic** (mə-nŏd'ĭk) […] *adj.* —**mo·nod'i·cal·ly** *adv.* —**mon'o·dist** (mŏ[…]
mo·noe·cious also **mo·ne·cious** (mə-nē'sh[əs]) […] Having male and female reproductive orga[ns] […] flowers on a single plant. 2. *Zool.* Hermaphro[ditic.] [NLat.] *Monoecia*, class name : Gk. *monos*, one + G[k.] […] —**mo·noe'cious·ly** *adv.*
mon·o·es·ter (mŏn'ō-ĕs'tər) *n.* An ester ha[ving one ester] group.
mo·nog·a·my (mə-nŏg'ə-mē) *n.* 1. The custo[m or condition] of being married to only one person at a time. [2. The condi]tion of having one mate for life. —**mo·nog'a**[…] […] **mo·nog'a·mous** *adj.* —**mo·nog'a·mous·ly** *adv.*
mon·o·gen·e·sis (mŏn'ə-jĕn'ĭ-sĭs) *n.* 1. The [doctrine that all] living organisms are descended from a single […] […]al reproduction, as by sporulation. 3. The d[evelopment of] an ovum into an organism resembling the p[arent without] metamorphosis. —**mo·nog'e·nous** (mə-nŏj'ə-[nəs])
mon·o·ge·net·ic (mŏn'ə-jə-nĕt'ĭk) *adj.* 1. Pe[rtaining to or] showing monogenesis. 2. Asexual. 3. Arising […] formation process, as a mountain range.
mon·o·gen·ic (mŏn'ə-jĕn'ĭk) *adj.* 1. Having […] single origin, as igneous rocks composed of a […] 2. a. Of or pertaining to monogenesis; mono[…] […] to monogenism. 3. Of or regulated by o[ne] […] of a pair of allelic genes. 4. Producing offsp[ring] […] one sex. —**mon'o·gen'i·cal·ly** *adv.*
mo·nog·e·nism (mə-nŏj'ə-nĭz'əm) *n.* The the[ory that all mank]ind has descended from a single pair of an[cestors.] […] —**mo·nog'e·nist** *n.* —**mo·nog'e·nis'tic** *adj.*
mon·o·gram (mŏn'ə-grăm') *n.* A design comp[osed of one or] more letters, usually the initials of a […] —*v.* […]grammed, **-gram·ming, -grams** also **-gram**[…] […]grams. To mark with a monogram. [LLat. *m[onogramma]* < Gk. *monogrammon* : *monos*, single + *gramma*, […] […] to write.] —**mon'o·gram·mat'ic** (-grə-m[ăt'ĭk])
mon·o·graph (mŏn'ə-grăf') *n.* A scholarly bo[ok or] pamphlet on a specific and usually limited sub[ject.] […]graph' *v.* **-graphed, -graph·ing, -graphs**. […] […] (mə-nŏg'rə-fər) *n.* —**mon'o·graph'ic** […] […]graph'i·cal·ly *adv.*
mo·nog·y·ny (mə-nŏj'ə-nē) *n.* The practice or [condition of] having only one wife at a time. —**mo·nog'y**[…] […]gynous *adj.*
mon·o·hy·brid (mŏn'ō-hī'brĭd) *n.* Hybrid offs[pring of parents] differing in a single characteristic or gen[e.]
mon·o·hy·drate (mŏn'ō-hī'drāt') *n.* A compo[und] […] hydrated molecules. —**mon'o·hy'drat'ed** *adj.*
mon·o·hy·dric (mŏn'ō-hī'drĭk) *adj.* Containing [one] […] hydroxyl radical.
mo·noi·cous (mə-noi'kəs) *adj.* Having archeg[onia and antheri]dia on the same plant; bisexual. [Alter. […]ecious.]
mon·o·lay·er (mŏn'ō-lā'ər) *n.* A film or stratu[m] […] one molecule thick; monomolecular lay[er.]
mon·o·lin·gual (mŏn'ə-lĭng'gwəl) *adj.* Using [or knowing] only one language. —**mon'o·lin'gual** *n.*
mon·o·lith (mŏn'ə-lĭth') *n.* 1. A large block o[f stone] […] used in architecture or sculpture. 2. A la[rge organization,] such as a corporation, that acts as a powe[rful] […] [Fr. *mono]lithe* < Gk. *monolithos*, consisting of a s[ingle stone :] *monos*, one + *lithos*, stone.]
mon·o·lith·ic (mŏn'ə-lĭth'ĭk) *adj.* 1. Consisting […] 2. Massive, solid, and uniform: *monolithic* […] —**mon'o·lith'i·cal·ly** *adv.*
mon·o·logue also **mon·o·log** (mŏn'ə-lôg', -l[ŏg']) […] A long speech made by one person, often monop[olizing a conver]sation. 2. a. A dramatic soliloquy. b. A liter[ary composition in] the form of a soliloquy. 3. A continu[ous series of] jokes or comic stories delivered by a single co[median.] [Fr. : Gk. *monos*], one + Gk. *logos*, speech.] —**mon'o·l**[…] […] **mon'o·log'i·cal** *adj.* —**mo·nol'o·gist** (r[…] […]-log'ist, -lôg'-) *n.*
mon·o·ma·ni·a (mŏn'ə-mā'nē-ə, -mān'yə) *n.* 1. [Pathological obsession] with one idea. 2. Intent concentration [on or exaggerated] enthusiasm for a subject or an idea. —**r**[…] […] *n.* —**mon'o·ma·ni'a·cal** (-mə-n[ī'ə-kəl])

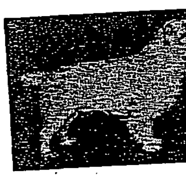


cloverleaf

clown



club



Clumber spaniel

Clydesdale

clove spice < OFr. *clou (de girofle)*, nail (of the clove tree) <
Lat. *clavus*, nail.]
clove² (klōv) *n.* One of the small sections of a separable
bulb, such as that of garlic. [ME < OE *clufu.*]
clove³ (klōv) *v.* A past tense and archaic past participle of
cleave¹.
clove⁴ (klōv) *v. Archaic.* Past tense of **cleave²**.
clove hitch *n. Naut.* A knot used to secure a line to a spar,
post, or other object, consisting of two turns with the sec-
ond held under the first. [ME *clove*, split, p.part. of *cleven*, to
split < OE *clēofan.*]
clo·ven (klō'vən) *v.* A past participle of **cleave¹**. —*adj.* Split;
divided.
cloven foot *n.* A cloven hoof. —**clo'ven-foot'ed** *adj.*
cloven hoof *n.* 1. A divided or cleft hoof, as in deer or
cattle. 2. Evil, based on the usual depiction of Satan as a
figure with cloven hoofs.
clo·ven-hoofed (klō'vən-hŏŏft', -hōōft', -hŏŏvd', -hōōvd')
adj. 1. Having cloven hoofs, as cattle do. 2. Satanic; devil-
ish.
clove oil *n.* An aromatic oil distilled from the dried flower
buds of the clove tree, used in medicine as an antiseptic.
clove pink *n.* A variety of the carnation, *Dianthus caryophyl-*
lus, having flowers with a spicy fragrance.
clo·ver (klō'vər) *n.* 1. A plant of the genus *Trifolium*, having
compound leaves with three leaflets and tight heads of small
flowers. Many species provide valuable pasturage. 2. Any of
several plants related to the clover, such as the bush clover.
—*Idiom.* **in clover.** Living a carefree life of ease, comfort, or
prosperity. [ME < OE *clæfre.*]
clo·ver·leaf (klō'vər-lēf') *n.* A highway interchange at which
two highways crossing each other on different levels are
provided with curving access and exit ramps enabling vehi-
cles to go in any of four directions.
clown (kloun) *n.* 1. A buffoon or jester who entertains by
jokes, antics, and tricks in a circus, play, or other presenta-
tion. 2. A coarse, rude, vulgar person; boor. 3. A rustic or
peasant. —*intr.v.* **clowned, clown·ing, clowns.** 1. To behave
like a clown or buffoon. 2. To perform as a jester or clown.
[Perh. of LG orig.] —**clown'ish** *adj.* —**clown'ish·ly** *adv.*
—**clown'ish·ness** *n.*
clox·a·cil·lin (klŏk'sə-sĭl'ĭn) *n.* A synthetic antibiotic of the
penicillin group that is effective against staphylococci.
[C(H)L(ORO)- + OX- + A(ZO) + (PENI)CILLIN.]
cloy (kloi) *v.* **cloyed, cloy·ing, cloys.** —*tr.* To supply with too
much of something, esp. with something too rich or sweet;
surfeit. —*intr.* To cause to feel surfeited. [Obs. *accloy* < ME
acloien.] —**cloy'ing·ly** *adv.* —**cloy'ing·ness** *n.*
cloze (klōz) *n.* A test of reading comprehension in which the
test taker is asked to supply words that have been systemat-
ically deleted from a text. [Alteration of CLOSURE.] —**cloze**
adj.
club (klŭb) *n.* 1. A stout, heavy stick, usually thicker at one
end than at the other, suitable for use as a weapon; cudgel.
2. A bat or stick used in certain games to drive a ball, esp. a
stick with a curved head used in such games as golf and
hockey. 3. a. A black figure on a playing card, shaped like a
trefoil or clover leaf. b. A card marked with such figures.
c. **clubs.** The suit so marked. 4. A group of people or-
ganized for a common purpose, esp. a group that meets
regularly. 5. The room, building, or other facilities used for
the meetings of a club. —*modifier: club regulations.* —*v.*
clubbed, club·bing, clubs. —*tr.* 1. To strike or beat with or
as if with a club. 2. To use (a rifle or similar firearm) as a
club by holding the barrel and hitting with the butt end.
3. *Archaic.* To gather or combine (hair, for example) into a
clublike mass. 4. To contribute for a joint or common pur-
pose. —*intr.* 1. *Archaic.* To form or gather into a mass.
2. To join or combine for a common purpose; form a club.
[ME < ON *klubba.*]
club·ba·ble also **club·a·ble** (klŭb'ə-bəl) *adj. Informal.*
Suited to membership in a social club; sociable.
club·by (klŭb'ē) *adj.* **-bi·er, -bi·est.** 1. Typical of a club or
club members. 2. Friendly; sociable. 3. Clannish; exclusive.
—**club'bi·ness** *n.*
club car *n.* A railroad passenger car equipped with lounge
chairs, tables, a buffet or bar, and other extra comforts.
club chair *n.* An upholstered easy chair with arms and a low
back.
club·foot (klŭb'fŏŏt') *n.* 1. Congenital deformity of the foot,
marked by a misshapen appearance often resembling a club.
2. A foot so deformed. —**club'foot'ed** *adj.*
club·house (klŭb'hous') *n.* 1. A building occupied by a
club. 2. The locker room for a sports team.
club·man (klŭb'mən, -măn') *n.* A man who is a member of a
club or clubs, esp. one who is active in club life.
club moss *n.* Any of various evergreen, erect or creeping,
mosslike plants of the genus *Lycopodium*, having tiny, scale-
like, overlapping leaves and reproducing by spores. [From
the club-shaped strobiles on some species of this plant.]
club root *n.* A disease of cabbage and related plants, caused
by a fungus, *Plasmodiophora brassicae*, and resulting in
large, distorted swellings on the roots.
club sandwich *n.* A sandwich, usually of three slices of
bread, with a filling of various meats, tomato, lettuce, and
dressing.
club soda *n.* An effervescent, unflavored water used in var-
ious alcoholic and nonalcoholic drinks.
club steak *n.* Delmonico steak.
club·wom·an (klŭb'wŏŏm'ən) *n.* A female member of a club
or clubs, esp. one who is active in club life.
cluck (klŭk) *n.* 1. a. The characteristic sound made by a hen
when brooding or calling her chicks. b. A sound resembling
a cluck. 2. *Informal.* A stupid or foolish person. —*v.*
clucked, cluck·ing, clucks. —*intr.* 1. To utter a cluck. 2. To
make a sound similar to a cluck, as in coaxing a horse. —*tr.*
1. To call by making a cluck. 2. To express by clucking: *He*
clucked disapproval. [Imit.]
clue also **clew** (klōō) —*n.* Something that guides or directs
in the solution of a problem or mystery. —*tr.v.* **clued, clu-**
ing or **clu·ing, clues** also **clewed, clew·ing, clews.** To give
(someone) guiding information: *Clue me in on what's hap-*
pening. [Var. of CLEW (from Theseus' use of a thread as a
guide through the Cretan labyrinth).]
Clum·ber spaniel also **clum·ber spaniel** (klŭm'bər) *n.* A
dog of a breed developed in England, having short legs and
a silky, predominantly white coat. [After *Clumber*, an estate
in Nottinghamshire, England.]
clump (klŭmp) *n.* 1. A clustered mass; lump. 2. A thick
grouping, as of trees or bushes. 3. A heavy dull sound; thud.
—*v.* **clumped, clump·ing, clumps.** —*intr.* 1. To form
clumps. 2. To walk with a heavy dull sound. —*tr.* To gather
into or form clumps of. [Prob. LG *klump* < MLG *klumpe.*]
—**clump'y** *adj.*
clum·sy (klŭm'zē) *adj.* **-si·er, -si·est.** 1. Lacking physical co-
ordination, skill, or grace; awkward. 2. Awkwardly made;
unwieldy: *clumsy wooden shoes.* 3. Gauche; inept: *a clumsy*
excuse. [< obs. *clumse*, to be numb with cold < ME *clomsen*,
of ON orig.] —**clum'si·ly** *adv.* —**clum'si·ness** *n.*
clung (klŭng) *v.* Past tense and past participle of **cling**.
clunk (klŭngk) *n.* 1. A dull sound; thump. 2. A hefty blow.
3. A stupid or dull person. —*v.* **clunked, clunk·ing, clunks.**
—*intr.* 1. To make or move with a clunk. 2. To strike some-
thing with a clunk. —*tr.* To strike with a clunk. [Imit.]
clunk·er (klŭng'kər) *n.* 1. A rattletrap, esp. an old car. 2. A
failure; flop.
clu·pe·id (klōō'pē-ĭd) *n.* Any of various oily, soft-finned
fishes of the family Clupeidae, which includes the herrings
and menhadens. —*adj.* Of or belonging to the Clupeidae.
[NLat. *Clupeidae*, family name < Lat. *clupea*, a kind of small
fish.]
clus·ter (klŭs'tər) *n.* 1. A group of the same or similar ele-
ments gathered or occurring closely together; bunch.
2. Two or more successive consonants in a word, as *cl* and *st*
in the word *cluster.* —*v.* **-tered, -ter·ing, -ters.** —*intr.* To
gather or grow into clusters. —*tr.* To cause to grow or form
into clusters. [ME < OE *clyster.*]
cluster headache *n.* A severe headache similar to migraine
that can occur several times daily for a period of weeks.
clutch¹ (klŭch) *v.* **clutched, clutch·ing, clutch·es.** —*tr.* 1. To
grasp and hold tightly. 2. To seize or snatch. —*intr.* To at-
tempt to grasp or seize: *clutch at the ring.* —*n.* 1. A hand,
claw, talon, or paw in the act of grasping. 2. A tight grasp.
3. Often **clutches.** Control or power: *the clutches of sin.* 4. A
device for gripping and holding. 5. a. Any of various de-
vices for engaging and disengaging two working parts of a
shaft or of a shaft and a driving mechanism. b. The lever,
pedal, or other apparatus that activates such a device. 6. A
tense or critical situation: *came through in the clutch.* [ME
clucchen, var. of *clicchen* < OE *clyccan.*]
clutch² (klŭch) *n.* 1. The number of eggs produced or incu-
bated at one time. 2. A brood of chickens. —*tr.v.* **clutched,**
clutch·ing, clutch·es. To hatch (chicks). [Var. of dial. *cletch*,
perh. < *cleck*, to hatch < ME *clekken* < ON *klekja.*]
clut·ter (klŭt'ər) *n.* 1. A confused or disordered state or col-
lection; jumble: *clutter in the attic.* 2. A confused noise;
clatter. —*v.* **-tered, -ter·ing, -ters.** —*tr.* To litter or pile in a
disordered state: *cluttered up the garage with tools and boxes.*
—*intr.* 1. To run or move with bustle and confusion. 2. To
make a clatter. [Prob. < ME *cloteren*, to clot.]
Clydes·dale (klīdz'dāl') *n.* A large, powerful draft horse of a
breed developed in the Clyde valley, Scotland.
clyp·e·ate (klĭp'ē-ĭt) also **clyp·e·at·ed** (-ā'tĭd) *adj.* 1. Shaped
like a round shield. 2. Having a clypeus.
clyp·e·us (klĭp'ē-əs) *n., pl.* **-e·i** (-ē-ī'). *Biol.* A shieldlike struc-
ture, esp. a plate on the front of the head of an insect.
[NLat. < Lat. *clipeus*, round shield.] —**clyp'e·al** *adj.*
clys·ter (klĭs'tər) *n. Med.* An enema. [ME *clister* < Lat. *clys-*
ter < Gk. *klustēr*, clyster pipe < *kluzein*, to wash out.]
Cly·tem·nes·tra also **Cly·taem·nes·tra** (klī'təm-nĕs'trə) *n.*
Gk. Myth. The wife of Agamemnon. [Lat. < Gk. *Klutaimnēs-*
tra.]
Cm The symbol for the element curium.
cni·do·blast (nī'də-blăst') *n.* A modified interstitial cell in
coelenterates that produces a nematocyst. [Gk. *knidē*, net-
+ -BLAST.]
Co The symbol for the element cobalt.
co– *pref.* 1. With; together; joint; jointly: *coeducation.*
2. a. Partner or associate in an activity: *co-author.* b. Sub-
ordinate or assistant: *copilot.* 3. To the same extent or degree:
coextend. 4. Complement of an angle: *cotangent.* [ME <
Lat. < *com-*, COM-.]